CLAIMS:

1. A method comprising:

calibrating a map that maps an output of a control device to values of at least one electrical stimulation parameter of a stimulation device;

receiving an output from the control device that reflects manipulation of a directional controller of the control device by a user;

selecting a value for the electrical stimulation parameter based on the received output and the calibrated map; and

providing the selected value to the stimulation device for application of electrical stimulation to a patient according to the selected value.

2. The method of claim 1, wherein the output of the control device comprises directional information that reflects a direction of a manipulation of the directional controller, and selecting a value for the electrical stimulation parameter comprises selecting a value of the stimulation parameter such that a direction of movement of paresthesia resulting from application of electrical stimulation according to the selected value reflects the direction of the manipulation of the directional controller.

3. The method of claim 1, wherein the values of the electrical stimulation parameter comprise combinations of electrodes from a set of electrodes coupled to the stimulation device.

4. The method of claim 1, wherein calibrating a map comprises:

receiving outputs from the control device that reflect manipulation of the directional controller to a plurality of predetermined locations;

receiving information that reflects paresthesia experienced by the patient when the directional controller is located at each of the locations; and

adapting a fixed map based on the outputs and the paresthesia information.

5. The method of claim 4, further comprising:

receiving information that describes a configuration of a set of electrodes coupled to the stimulation device; and

selecting the fixed map based on the configuration information.

6. The method of claim 4, wherein the paresthesia information comprises at least one of an amplitude level associated with a stimulation perception threshold, and an outline of a paresthesia region on a body diagram.

7. The method of claim 4, wherein the plurality of predetermined locations comprises two diametrically opposed corners of a manipulation range of the directional controller.

8. The method of claim 4, wherein the plurality of predetermined locations comprises four corners and a center of a manipulation range of the directional controller.

9. The method of claim 4, wherein adapting a fixed map comprises applying Euclidian transforms to the fixed map based on the outputs and the paresthesia information.

10. The method of claim 1, wherein the user manipulates the directional controller to test a plurality of values of the electrical parameter by application of electrical stimulation to the patient via the stimulation device according to the plurality of values.

11. The method of claim 10, wherein calibrating a map comprises:

receiving paresthesia and positional reference information during the testing; and

continually calibrating the map based on the paresthesia and positional reference information.

12. The method of claim 10, further comprising:

identifying one of the tested values based on input received from the user via the control device; and

providing a value of the parameter to the stimulation device for testing, wherein the provided value is equivalent to the identified value.

13. The method of claim 10, further comprising:

identifying one of the tested values based on input received from the user via the control device; and

recalibrating the map such that a center position of a manipulation range of the directional controller corresponds to the identified value.

14. The method of claim 10, wherein the map comprises amplitude scale factors associated with at least some of the values of the parameter, the method further comprising determining the amplitude scale factors based on paresthesia information received from the user during at least one of the testing and the calibration.

15. The method of claim 10, further comprising:

identifying one of the tested values based on input received from the user via the control device; and

storing the identified value for reapplication by the stimulation device at a later time.

16. The method of claim 1, wherein the user is one of a clinician and the patient.

17. A mapping system comprising:

an input circuit to receive an output from a control device, the output reflecting manipulation of a directional controller of the control device by a user;

a memory to store a map that maps the output of the control device to values of at least one electrical stimulation parameter of a stimulation device;

a telemetry circuit; and

a processor to calibrate the map, select a value of the parameter based on the output of the control device and the calibrated map, and provide the selected value to a stimulation device via the telemetry circuit for application of electrical stimulation to a patient according to the selected value.

18. The mapping system of claim 17, wherein the values of the electrical parameter comprise combinations of electrodes from a set of electrodes coupled to the stimulation device.

19. The mapping system of claim 17, wherein the output of the control device comprises directional information that reflects a direction of a manipulation of the directional controller, and the processor selects a value for the electrical stimulation parameter such that a direction of movement of paresthesia resulting from application of electrical stimulation according to the selected value reflects the direction of the manipulation of the directional controller.

20. The mapping system of claim 17, wherein the memory stores a plurality of maps, each map mapping the output of the control device to one of a plurality of electrical stimulation parameters, and the processor selects one of the maps for use in selecting values of a respective electrical stimulation parameter.

21. The mapping system of claim 20, further comprising an operation mode switch, wherein the processor selects one of the maps based on the position of the switch.

22. The mapping system of claim 21, wherein the operation mode switch comprises one of a knob, a lever, a toggle switch, a rocker button, a keyboard key, or a touch screen button.

23. The mapping system of claim 21, further comprising the control device, wherein the operation mode switch is located on the control device.

24. The mapping system of claim 20, wherein the plurality of electrical stimulation parameters comprise at least one of pulse amplitude, pulse width and pulse rate.

25. The mapping system of claim 17, wherein the processor receives outputs from the control device that reflect manipulation of the directional controller to a plurality of predetermined locations, receives information that reflects paresthesia experienced by the

patient when the directional controller is located at each of the locations, and calibrates the map by adapting a fixed map based on the outputs and the paresthesia information.

26. The mapping system of claim 25, wherein the processor receives information that describes a configuration of a set of electrodes coupled to the stimulation device, and selects the fixed map based on the configuration information.

27. The mapping system of claim 25, wherein the paresthesia information comprises at least one of an amplitude level associated with a stimulation perception threshold and an outline of paresthesia region on a body diagram.

28. The mapping system of claim 27, wherein the user inputs the paresthesia information using the control device, and the processor receives the paresthesia information via the input circuit.

29. The mapping system of claim 25, wherein the plurality of predetermined locations comprises two diametrically opposed corners of a manipulation range of the directional controller.

30. The mapping system of claim 25, wherein the plurality of predetermined locations comprises four corners and a center of a manipulation range of the directional controller.

31. The mapping system of claim 25, wherein the processor applies Euclidean transforms to the fixed map based on the outputs and paresthesia information.

32. The mapping system of claim 17, wherein the user manipulates the directional controller to test a plurality of values of the electrical parameter by application of electrical stimulation to the patient via the stimulation device according to the plurality of values.

33. The mapping system of claim 32, wherein the processor continually calibrates the map based on paresthesia and positional reference information received during the testing.

34. The mapping system of claim 32, further comprising an indicator button, wherein the processor identifies one of the tested values based on input received from the user via the indicator button.

35. The mapping system of claim 34, wherein the processor provides a value of the parameter that is equivalent to the identified value to the stimulation device for testing.

36. The mapping system of claim 34, wherein the processor recalibrates the map such that a center position of the directional controller corresponds to the identified value.

37. The mapping system of claim 34, wherein the processor stores the identified value in the memory for reapplication by the stimulation device at a later time.

38. The mapping system of claim 34, further comprising the control device, wherein the control device includes the indicator button.

39. The mapping system of claim 38, wherein the indicator button is disposed on the directional controller.

40. The mapping system of claim 32, wherein the map includes amplitude scale factors associated with at least some of the values of the parameter, and the processor determines the amplitude scale factors based on paresthesia information received from the user during at least one of the testing and the calibration.

41. The mapping system of claim 17, further comprising the control device, wherein the directional controller of the control device is selected from a group consisting of: a knob, a joystick, a button pad, keyboard arrow keys, a touch screen, and a mouse.

42. The mapping system of claim 41, wherein the control device includes an amplitude adjustment knob.

43. The mapping system of claim 17, wherein the mapping system comprises a computing device that includes the input circuit, memory, processor, and telemetry circuit.

44. The mapping system of claim 43, further comprising the control device, wherein the computing device comprises a handheld computer that includes the control device.

45. The mapping system of claim 44, wherein the handheld computer includes a display, and the processor displays a body diagram and receives an outline of a paresthesia region on the body diagram as input from the user via the display.

46. The mapping system of claim 17, wherein the user is one of a clinician and the patient.

47. A computer-readable medium comprising instructions that cause a programmable processor to:

calibrate a map that maps an output of a control device to values of at least one electrical stimulation parameter of a stimulation device;

receive an output from the control device that reflects manipulation of a directional controller of the control device by a user;

select a value for the electrical stimulation parameter based on the received output and the calibrated map; and

provide the selected value to the stimulation device for application of electrical stimulation to a patient according to the selected value.

48. The computer-readable medium of claim 47, wherein the output of the control device comprises directional information that reflects a direction of a manipulation of the directional controller, and the instructions that cause a programmable processor to select a value for the electrical stimulation parameter comprise instructions that cause a programmable processor to select a value for the electrical stimulation parameter such that a direction of movement of

paresthesia resulting from application of electrical stimulation according to the selected value reflects the direction of the manipulation of the directional controller.

49. The computer-readable medium of claim 47, wherein the values of the electrical stimulation parameter comprise combinations of electrodes from a set of electrodes coupled to the stimulation device.

50. The computer-readable medium of claim 47, wherein the instructions that cause a programmable processor to calibrate a map comprise instructions that cause a programmable processor to:

receive outputs from the control device that reflect manipulation of the directional controller to a plurality of predetermined locations;

receive information that reflects paresthesia experienced by the patient when the directional controller is located at each of the locations; and

adapt a fixed map based on the outputs and the paresthesia information.

51. The computer-readable medium of claim 50, further comprising instructions that cause a programmable processor to:

receive information that describes a configuration of a set of electrodes coupled to the stimulation device; and

select the fixed map based on the configuration information.

52. The computer-readable medium of claim 50, wherein the paresthesia information comprises at least one of an amplitude level associated with a stimulation perception threshold, and an outline of a paresthesia region on a body diagram.

53. The computer-readable medium of claim 50, wherein the plurality of predetermined locations comprises two diametrically opposed corners of a manipulation range of the directional controller.

54. The computer-readable medium of claim 50, wherein the plurality of predetermined locations comprises four corners and a center of a manipulation range of the directional controller.

55. The computer-readable medium of claim 50, wherein the instructions that cause a programmable processor to adapt a fixed map comprise instructions that cause a programmable processor to cause the processor to apply Euclidian transforms to the fixed map based on the outputs and the paresthesia information.

56. The computer-readable medium of claim 47, wherein the user manipulates the directional controller to test a plurality of values of the electrical parameter by application of electrical stimulation to the patient via the stimulation device according to the plurality of values.

57. The computer-readable medium of claim 56, wherein the instructions that cause a programmable processor to calibrate a map comprise instructions that cause a programmable processor to:

receive paresthesia and positional reference information during the testing; and

continually calibrate the map based on the paresthesia and positional reference information.

58. The computer-readable medium of claim 56, further comprising instructions that cause a programmable processor to:

identify one of the tested values based on input received from the user via the control device; and

provide a value of the parameter that is equivalent to the identified value to the stimulation device for testing.

59. The computer-readable medium of claim 56, further comprising instructions that cause a programmable processor to:

identify one of the tested values based on input received from the user via the control device; and

recalibrate the map such that a center position of a manipulation range of the directional controller corresponds to the identified value.

60. The computer-readable medium of claim 56, wherein the map comprises amplitude scale factors associated with at least some of the values of the parameter, and the computer readable medium further comprises instructions that cause a programmable processor to determine the amplitude scale factors based on paresthesia information received from the user during at least one of the testing and the calibration.

61. The computer-readable medium of claim 56, further comprising instructions that cause a programmable processor to:

identify one of the tested values based on input received from the user via the control device; and

store the identified value for reapplication by the stimulation device at a later time.

62. The computer-readable medium of claim 47, wherein the user is one of a clinician and the patient.